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TECHNICAL MANUAL

STANDARDS AND CRITERIA FOR TECHNICAL INSPECTION AND CLASSIFICATION OF TIRES (FSC 2610)

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TECHNICAL MANUAL
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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *29 August 1975*

STANDARDS AND CRITERIA FOR TECHNICAL INSPECTION AND CLASSIFICATION OF TIRES (FSC 2610)

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* This manual supersedes TM 9-2610-201-14, 12 July 1972 and TM 9-2610-201-14-1, 30 April 1973, including all changes.

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CHAPTER 1
INTRODUCTION

Section I. TECHNICAL INSPECTION

1–1. General

The criteria established in this chapter are published for the technical inspection and classification of tires (FSC 2601) and supersede all previous standards and criteria published for technical inspection and classification of tires. Elements of maintenance authorized to classify tires are:

a. Tire Repair and Retread Companies
b. TDA Shops and Qualified Inspectors
c. General Support Units
d. Depots

NOTE

This publication has nothing to do with tire ESC. Do Not Use As Such.

1–2. Responsibility

It is the responsibility of all categories of maintenance to prevent abuse which will cause a tire to become unserviceable/unrepairable, thus jeopar-

dizing the operational readiness of the equipment and causing monetary loss to the Army. A very important phase of tire usage is the preventative maintenance performed by the vehicle driver.

1–3. Direct Exchange

a. A direct exchange system is necessary to control tire transactions through the supply system. Although the receipt and issue of a tire is a supply action, the inspection and classification is a maintenance responsibility. Only through proper coordination between Maintenance and Supply will a direct exchange system be successful. Tires should not be accepted by Supply for direct exchange unless evidence of inspection and classification by Maintenance is presented.

b. The Organizational Supply Unit will not issue a tire without receiving the unserviceable tire for turn in to the Organizational Maintenance Shop. If Organizational Maintenance cannot effect repairs because they are beyond their capabilities, the tire will be sent to Direct Support Units.

1–4. Training Courses

Red River Army Depot conducts training courses on inspection and classification of tires. Students may attend the courses at Red River Army Depot.

For large groups, arrangements can be made through Red River Army Depot or through the US Army Tank-Automotive Command's Technical Assistance and New Equipment Training Division (Maintenance Directorate). Courses may be conducted in other designated locations. Submit written applications to:

Commander
Red River Army Depot
ATTN: AMXRR-MO
Texarkana, Texas 75501
Telephone: Autovon 965, Ext. 2600

Commander
US Army Tank-Automotive Command
ATTN: AMSTA-ML
Warren, Michigan 48090
Telephone: Autovon 273, Ext. 1456/2287

1–5. Reporting Field Failures

In the event that field failures occur during usage after acceptance of retreaded or repaired tires, the failures shall be reported on DA Form 2407. Basic reporting procedures contained in TM 38–750 are to be utilized for reporting these failures. This is a part of the Army Maintenance Management System (TAMMS), and the use of DA Form 2407 as Equip-

ment Improvement Report (EIR) is spelled out in TM 38–750.

1–6. Reporting of Errors

You can improve this manual by calling attention to errors and by recommending improvements. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Tank Automotive Command, ATTN: AMSTA-MTP, Warren, MI 48090. A reply will be furnished direct to you.

Section II. REPAIR STANDARDS

1–7. Purpose

These instructions are published for use by personnel responsible for inspection and classification of pneumatic tires. This is a guide to identify CRC B tires not requiring repairing/retreading which should be returned to the supply system for reissue; CRC F tires, unserviceable economically repairable, and CRC H, unserviceable (condemned) or uneconomically repairable. These instructions apply to Organizational Maintenance, Direct and General Support (i.e., Field) Maintenance and Depot Maintenance units based on their capabilities, facilities and skills required to inspect and repair tires. How-

(9) Inspect steering mechanisms (wheel bearings, steering knuckles, steering gears, etc.)

c. Inspection of tire tread. Use the tire tread depth gage (fig. 1–1) NSN 5210–00–019–3050. To open, pull the contact bar out to form a T. Before opening, make sure the plunger top is pulled in all the way, or it will bend.

d. Retreading. Retreading can be performed more than once as long as the casing is removed from the vehicle before damage occurs. For passenger vehicles, tires should be removed when the tread depth averages 1/16 inch (2/32"), and for trucks ⅛ inch (4/32"). (Gage markings are in thirty seconds of an inch). On reaching this tread depth, tire should be replaced with a serviceable tire.

e. For Use On Military Tires: Measure from the center line (fig. 1–2) approximately ¾ inch–2 inch from center line depending on tire size. Place the contact bar so it is parallel with the tire center line. Press the plunger down until its tip touches the center of the tread groove. Read the tread depth on the gage. Measure the tread at three equally-spaced points around the circumference of the tire starting at the valve stem if mounted or mark the tire for starting point if demounted.

b. The operator must consider the importance of proper care and maintenance. He must recog-

nize that while natural wear and tear affects tire life, premature tire failure can be attributed to abuse and neglect. Proper maintenance of tire will not only result in better performance and longer service, but could prevent a hazardous tire failure with possible loss of life and equipment.

1–9. Organizational Maintenance

a. Organizational Maintenance. Organizational Maintenance consists of periodic services prescribed in the applicable vehicle technical manuals, as well as TM 9–2610–200–20. The participation of the operator is required during some of these services.

b. During Scheduled Maintenance the Following Items Must Be Inspected:

(1) Correct deficiencies noted by operator in Operator Maintenance (para 1–8).

(2) Match and install tires according to tread design and degree of wear.

(3) Check all wheel nuts, rims and side rings for secureness and serviceability.

(4) Check that wheel turning stops are present and secure.

(5) Turn front wheels fully in both directions and check whether turns are limited by stops and whether tires clear all parts of the vehicle.

(6) Insure that the tires are of the proper size and tread design.

f. Tire Tread Depth Location Measurements:

Tire size	*Location from center line in inches*
700 × 16	¾"
900 × 16	1-¼"
825 × 20	1-¼"
900 × 20	1-¼"
1100 × 20	1-½"
1200 × 20	1-½"
1400 × 20	2-0"

g. Commercial Tires, Measuring the Tread Depth: Bridge the tread groove with the contact bar and press the plunger into the center of the groove to get your reading. Start at valve stem if mounted or mark tire if demounted for starting point. Measure three equally-spaced points around the circumference of the tire close as practicable to the tread center line.

h. Off-Road Tires: Serviceable tread depth of off-road vehicle (industrial/earthmoving equipment) cannot be arbitrarily defined. The tire should be replaced when the tread is worn to a point where adequate traction is no longer provided under the particular usage. However, to prevent any damage to the casing which may preclude retreading the tire should be removed when the tread reaches ⅛ inch (4/32").

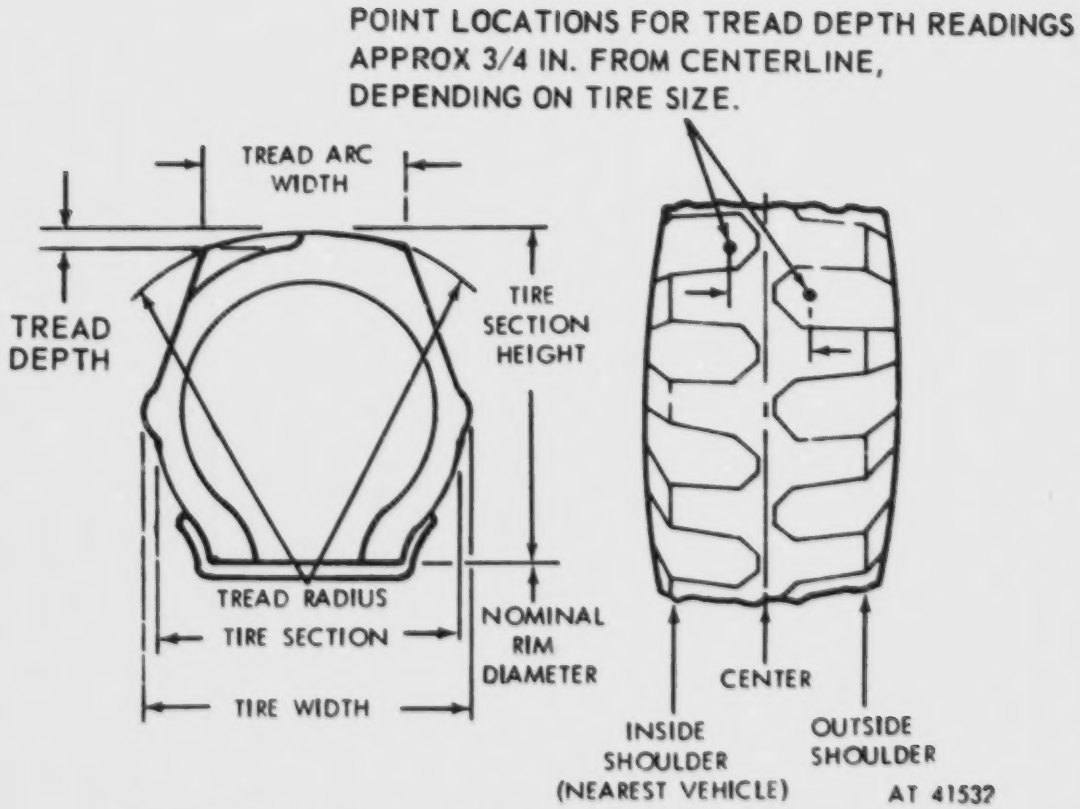

Figure 1-2. Features of tires requiring physical measurement.

i. Painting of Tires

(1) This procedure of painting tires for appearance does not provide any functional benefit. It is against maintenance policy to paint tires in order to make them look new or clean. Soap and water at time of vehicle washing will suffice.

(2) The way to protect tires from atmospheric attack is described in TM 9–2610–200–20. These instructions are for the tires in storage. Tires in use do not need this protection because the rubber from which military tires are made has protective compounds mixed into it. These compounds remain active as long as the tires are exercised.

1–10. Classification Codes

The following condition codes are applicable to pneumatic tires and are defined as follows:

a. Code "A"—New tire, less than 66 months old.

b. Code "B" tire:

(1) Serviceable used tire (table 1).

(2) Reconditioned Tire (retreaded).

NOTE

App 11–33, AR 725–50, indicates that CRC B is a serviceable item (issuable with qualification). It further explains that it is new, used (with 50 percent or more tread remaining), repaired or reconditioned

material which is serviceable and issuable for its intended purpose, but which is restricted from issue to specific units, activities, or geographical areas *by reasons of its limited usefulness or short service life expectancy.* As a matter of clarification, a properly repaired/retreaded tire has a serviceable classification. Repair/retread procedures and specifications, in addition to tire casing selection criteria, have been established to assure that repaired/retreaded tires meet the standards of serviceability. To this effect, the latest guidance of Department of Transportation and the methods and techniques developed by industry are followed. The condition Code B is assigned to repaired/retreaded tires for control and identification purposes only, and has no connection toward the limited usefulness or short service life expectancy as defined in App 11–33, AR 725–50.

c. Code "F" Unserviceable—economically repairable tire requires repairing/retreading to become serviceable.

d. Code "H" Unserviceable—uneconomically repairable. Dispose of in accordance with AR 755–1.

Table I. Minimum Tread Depth for Ready for Issue Tires

Treads will not be replaced on tires having more tread than the minimum specified in table 1, when measured at three equally spaced points around the circumference of the tire as close as practicable to the read center. This table is intended for supply personnel issuing tires. It does not apply to tires mounted on vehicles.

Type tire design	*Tire Size cross-section*	*Min. tread depth (in.)*
Passenger Car	6.00–13 (A-78–13)	6/32
	9.50–14, 6.00–15	
	8.90–15, 6.00–16	
	8.90–16	
Light Truck, Highway Design	6.00–16, 7.00–16, 6 ply	6/32
	9.00–16, 8 ply	
Truck, Highway Design	7.00–20, 8.25–20	8/32
	9.00–20, 10.00–20, 11.00–20	
	12.00–20, 13.00–20, 14.00–20	
	9.00–22, 10.00–22, 11.00–22	
	12.00–22, 13.00–22, 14.00–22	
	9.00–24, 10.00–24, 11.00–24	
	12.00–24, 13.00–24, 14.00–24	
Non-Directional, Military Desert sand flotation)	11.00–18, 12.50–20	6/32
	11.75–20	
Special Service, Earthmover	13.00–20, 13.00–24, 13.00–25	12/32
Directional, M706	14.00–20, 26 ply sidewall 12 ply rated	
Grader, Tractor, Industrial, Etc.	14.00–20, 14.00–21	13/32
	14.00–24, 14.00–25	
	16.00–20, 16.00–21	15/32
	16.00–24, 16.00–25	

	18.00–24, 18.00–25	17/32
	21.00–24, 21.00–25	19/32
Industrial, Earth-mover DRC Type Tread	20.5–25	18/32
	24.00–25, 24.00–29	21/32
	32.5–25	
	26.5–25	22/32
	27.00–33	
	29.5–25, 29.5–29	23/32
	33.53–33	24/32
	30.00–33, 30.00–41	25/32
	36.00–41	26/32
	37.5–33, 37.5–39	28/32
Low Platform Trailer, Highway Design	7.50–15, 8.25–15	8/32
	9.00–15, 10.00–15	
Non-Directional Cross-Country, Mud and Snow Design	6.00–16, 6.50–16	8/32
	7.00–16, 7.50–16	
	9.00–16	10/32
	7.00–20, 7.50–20, 8.25–20	
	9.00–20, 10.00–20, 11.00–20	
	12.00–20	
	10.00–22, 11.00–22, 12.00–22	
	11.00–24, 11.00–24, 12.00–24	
	10.50–18	
	14.00–20, 14.00–24, 16.00–25	12/32

NOTE

The minimum tread depths in this table are the equivalents of roughly 50 percent

of new or retreaded tire tread depth, measured to the nearest 1/32 inch. This table is for ready to issue tires.

Section III. PRELIMINARY INSPECTION AND DEFINITIONS

NOTE

This section applies to Direct and General Support and Depot Maintenance units not having qualified tire inspectors.

1–11. Preliminary Inspection

The following are three types of visual preliminary inspections used to classify a tire:

a. The visual inspection performed as a preliminary survey to select out those tires which are obviously unrepairable, CRC H. These are tires which have blown out, have been run flat and are torn to pieces or have been burned in a fire. If the tire is not completely destroyed, it should be considered repairable, classified CRC F and turned in for repairing/retreading. This type of inspection can be performed by any person assigned the job. It is up to the local command to establish procedures to authorize classification and disposal of these tires at organizational or higher categories of maintenance.

b. Another important factor is cost of a tire. A tire will not normally be repaired if the cost of repairs, including transportation to and from the repair facility exceeds 90 percent of the acquisition cost of the tire. Instead, this tire will be classified CRC H. However, only a qualified tire inspector can make this determination. Therefore, if there is doubt, the tire should be turned in for repair.

c. Tires which do not show any obvious reason for CRC H classification as stated above should be placed on a tire inspection spreader. This tire will be thoroughly inspected for detection of hidden injuries so as to determine the proper classification of the tire. Any tire not showing an evident reason for CRC H classification will be turned in to the repair facility as CRC F for further inspection, classification and disposal.

1–12. Definition

(figures 1–3, 1–4, 1–5)

a. BEADS—The part of the tire that is shaped to fit the rim. The bead is usually reinforced with rubber-insulated steel wires.

b. BEAD SEPARATION—A breakdown of bond between components in the bead area.

c. BOWED BEAD—A bead deformed into an elliptical shape due to pressure resulting from the

weight of other tires stacked on top. NOTE: This type of deformity should be corrected by subsequent inflation of the tire and is *not* a cause for rejection.

d. BREAK—A crack extending into or through the fabric. An impact break is usually in the shape of an X or star and can be seen from the inside of the tire. A flex or circumferential break runs parallel to the bead.

e. CASING—Tire structure except tread and sidewall rubber.

f. CHAFER FABRIC—The layer of fabric covering the bead in the area between the bead and the rim, which protects the bead from abrasion due to contact with the rim flange.

g. CHUNKING—The breaking away of pieces of the tread from casing.

h. CORD—The strands forming a fabric ply in the tire.

i. CORD SEPARATION—Cords parting away from adjacent rubber compounds.

j. CROSS SECTION—Maximum width of tire.

k. FABRIC—cord stock constructed of rayon, nylon, polyester, fiberglass or wire coated with rubber, used to make up casing of pneumatic tires.

l. GROOVE—The space between two adjacent tread ribs.

m. KINKED BEAD—A bead deformed from its original shape to such extent that re-inflation of the tire will not restore it to its original configuration.

n. LINER—The tubeless tire inner surface used to retain the inflation medium.

o. PLY—A layer of rubber-coated parallel cords.

p. PLY SEPARATION—A parting of rubber compound between adjacent plies.

q. RADIAL CRACKING—Cracking on tread shoulder, usually near or in rib area resulting from under inflation.

r. REINFORCEMENT—Any material, usually rubber and fabric, vulcanized to the tire to add strength to the cord body at an injury.

s. REPAIR PATCH—The reinforcing material used to strengthen tire in the area of injury.

t. REPAIR PLUG—The rubber material that fills the cavity of injury in a tire.

u. REPAIR TIRE—Any tire with punctures, cuts or other types of injuries that have been reconditioned as required to provide additional safety.

v. RETREADED TIRE—A sound tire body on which the tread has been replaced to like-new condition to extend the usable life of the tire.

w. SECTION REPAIR—Repair to a casing when

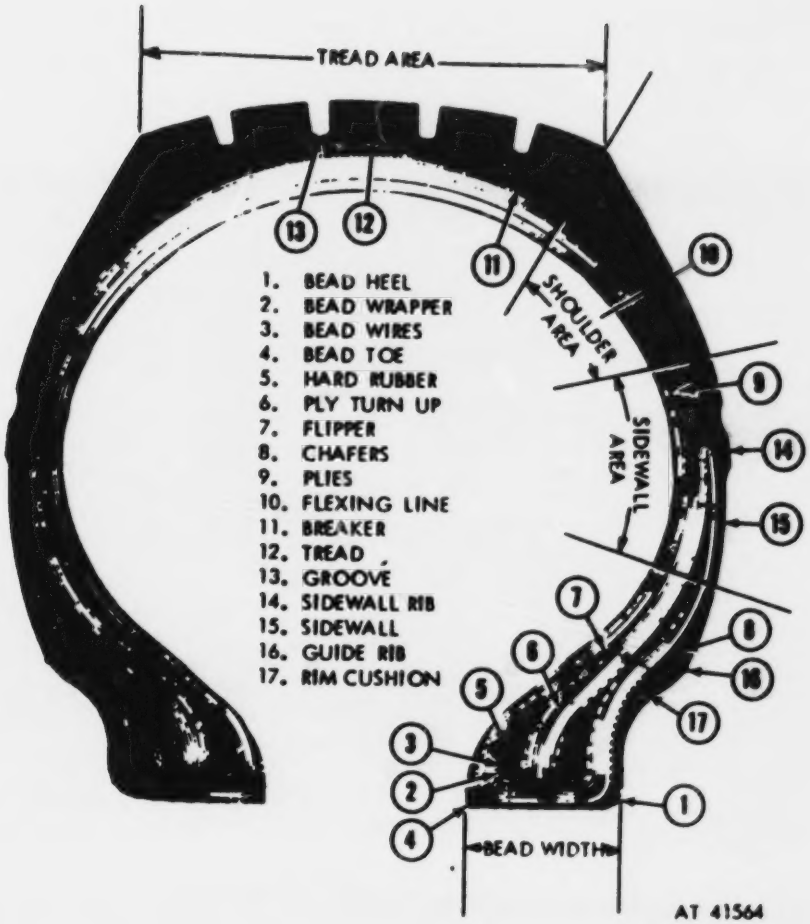

Figure 1–3. Cross-section of tire.

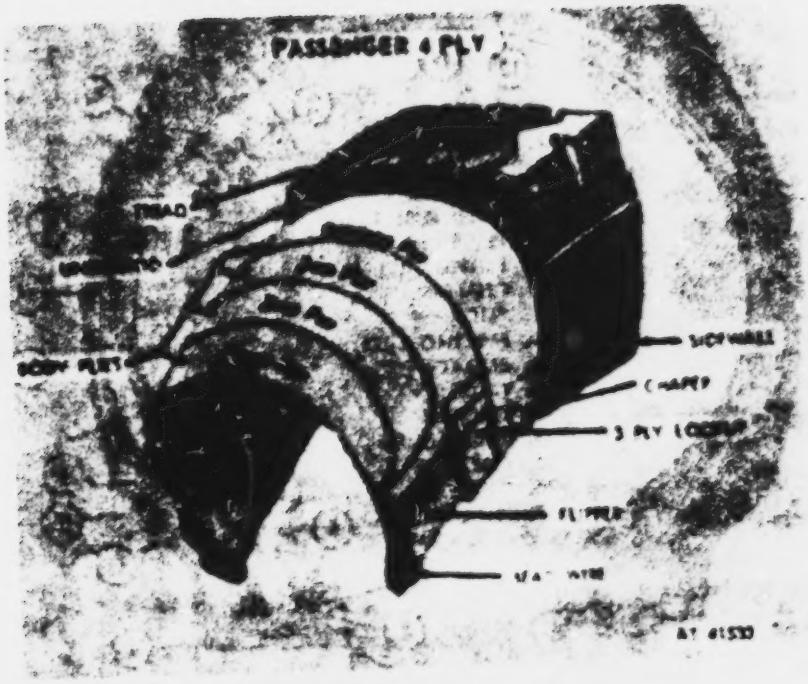

Figure 1–4. Construction of car tire.

Figure 1-5. Construction of truck tire.

injury has extended through the tread or sidewall of tire.

x. SEPARATION—Any parting or void within the tire body structure, indicated by bubbles, blisters or other unusual deformation of the regular inner or outer tire surface.

y. TREAD—The portion of the tire that comes in contact with road surface.

z. TREAD DEPTH—The distance measured from the base of the tread design to the top of the tread in the major grooves.

aa. TREAD SEPARATION—Tread pulling away from the tire at interface of new tread rubber and buffed surface.

Section IV. REPAIR CRITERIA

1–13. General

The section applies to those categories of maintenance authorized to repair or retread pneumatic tires.

1–14. Retread/Repair Methods

Refer to table 2 for inspection marking codes to be used on Code "F" tires. Remember, not all tires that come to depot are Code "F".

1–16. Tips for the Inspector

a. Foreign objects must be removed by using the long-nose pliers. The presence of a foreign object is dangerous during buffing operations.

b. Keep in mind that fabric fatigue is evident if discoloration or streaks are noted in the inside shoulder area.

c. The primary inspection of tubeless tires is *most important.* Tubeless tires must have airtight integrity. The smallest hole in the inner liner will cause failure of the tire. Locate every hole in the inner liner by visual inspection and probing each and ever defect. *The best lighting is most important.*

d. Each tire must be probed for ply separation. Moisture is the primary cause of ply separation. Sometimes it appears as a blister or bulging at the shoulder. At other times it will be undetectable until the tire is buffed in the retreading operation. Nevertheless, since a tire is classified Code H if a separation is found, the inspector will save money if he can find it prior to buffing.

e. In essence, the inspector must recognize that there is no substitute for a thorough primary inspection. To this effect, the inspector must:

(1) Have adequate tools.

(2) Have adequate lighting for the inspection spreader.

(3) Utilize proper markings in the classification of repairs/retreading.

(4) Know the characteristics of the tire he is inspecting to properly determine the type of repair/retreading the case will require.

1–16. Recommended Tools and Equipment

Depth Gage 5210–00–019–3050
Probing Awl 5110–00–449–8047
(can be fabricated)
Tire Spreader 4910–00–190–5245
(6:00X16—14:00X24)
Crayon, Yellow, rubber 7510–00–264–4612
marking or pencil, china
marking, yellow
Long-nose Pliers 5120–00–247–5177
Light, extension 6230–00–239–3518

1–17. Inspection Marking of Tires

a. During inspection of tires for the conditions and deficiencies listed, clearly mark with yellow crayon, by circling or X marking, location of deficiencies as stipulated in paragraph 1–20 of these instructions (Column—Inspection Marking).

b. Tires classified by a qualified inspector as CRC "H" will be marked with a letter "H" on at least three places inside the tire and one place on the

crown, using yellow, non-water-soluble paint. Lettering should be as large as possible, and at least 3 inch x 2 inch.

1-18. Tire Inspection Check List

Figure 1–6 provides a recommended Tire Inspection Check List. The requirements of this check list are minimum requirements for the proper control in the classification of tires.

1-19. Commercial Passenger Tires Inspection—Group 1

Tire casings which contain any of the following deficiencies are not acceptable for repairing/retreading and will be classified CRC H.

a. Ply separation.

b. Tread, shoulder or sidewall separation (between rubber and cord).

c. More than surface weather checking.

d. Radial split(s) which cannot be completely removed without damage to the cord.

e. Any groove or shoulder cracking beyond the surface area which cannot be satisfactorily removed in the buffing operation.

f. Nonrepairable sidewall splits or cuts.

g. Loose cords on the inner ply or evidence of having been run flat.

h. Exposed, kinked or damaged bead wires.

i. Generally weakened or deteriorated condition due to age, moisture, or exposure to other severely destructive influences.

j. Oil soaked or permanently misshapen due to faulty maintenance or storage conditions.

k. Casings which when processed would not meet the dimensional requirements.

l. Have any injury requiring a reinforcement or sectional repair or evidence of having had a previous repair of this type.

m. Be less than full four-ply construction unless the original casing construction is reinforced with breaker strips or belt. A belted tire which has two plies in side wall plus two belts (2 + 2) is retreadable.

n. Have at least three or more adjacent cords broken in any ply. Old injuries, including nail holes repairs, shall be investigated and if compliance with this requirement cannot be determined, the casing shall be rejected.

o. When tubeless type, be incapable of providing air retention equal to that of a conventional tire and tube. The liner shall not be porous and splices which show exposed fabric or can be suspected of opening to the fabric during the new tread life of the tire, shall cause rejection of the casing.

p. Have wear extending to the fabric or so close

to the fabric that the top cord ply (or breaker, or belt) will be exposed in the buffing operation.

1–20. Tire Inspection Marking Codes (Commercial, Tactical and Industrial Except Group 1)

All tires, as specified in this paragraph, to be considered for repair and retreading shall be free from all defects indicated below:

a. Ply separation, which in the opinion of the inspector, will exceed 25 percent of the tire's cross section after skiving, measured at the widest ply opening (table 3).

b. Beads with fabric cut or damaged more than 25 percent of the body plies in depth on tube type tires.

c. Chafer fabric injuries in tubeless tires.

d. Broken, kinked, or exposed bead wires.

e. Fabric flex break (This defect is indicative of progressive fatigue, failure of body structure and will not be repaired regardless of size).

f. Loose cords on the inner ply or evidence of having been run under-inflated or overloaded.

G. Tread separation, other than that which can be removed in the buffing operation.

h. Generally weakened condition of embrittlement, reversion or deterioration due to service, *age,*

moisture, or exposure. The policy on inspection for repair and retreading will be based on defects rather than age.

i. Tubeless tires with unrepairable liner.

j. Any type of casing injury requiring what is commonly known as a section repair or reinforcement repair in excess of the number, size and location of the permissible repair shown in table 3.

k. Any groove cracks in excess of number of injuries indicated in table 3 and affecting more than 25 percent of the body plies or if two radial cracks are close enough that reinforcement patches overlap.

l. Any tire so worn that buffing to the proper contour will damage the outer body plies.

Prior to submitting Code F tires to a commercial contractor for repair/retreading, the inspector will sign his name inside the tire with a yellow marking pencil (NSN 7510–00–264–4612). This will enable the using unit to identify the tire when it is returned, thereby protecting government property.

Table 2. Inspection Marking Codes

Method	Type	Inspection marking
RETREAD—HOT CURED METHOD		
Full	Type 1–A	R–3
Top	Type 1–B	T–1
Relugged	Type 1–C	R–2
Bead to Bead	Type 1–D	M–4
REPAIR		
Section	Type 11–D	X
Spot	Type 11–B	(Circle)
Reinforcement	Type 11–C	R–4
Nail Hole	Type 11–A	X on each bead
RETREAD—PRECURED TREAD METHOD		
TOP	Type 111	T2

Note 1. Top tread is a process in which the applied tread rubber covers only the tread area of the used tire after it has been properly buffed and prepared for treading. At present, there is no authorized method of topcapping for military tactical tires or other mud and snow off-the-road type tires where the topcap would interfere with the traction characteristics of the tire.

Table 3. Maximum Size of Permissible Repairs (measured after skiving)

80

Tire Size	Ply rating	Max. dimension of opening in plies after skiving		Min. distance of skived edge	Max. No. of repairs
		Tread inches	Sidewall inches	from bead inches	per tire
6.00–16	6	–	–	–	0
7.00–16 LW	6	–	–	–	0
7.50–10	6	–	–	–	0
7.50–16	6	–	–	–	0
7.50–20	8	2	1	3	1
9.00–16	8	2¼	1	3	1
9.00–20	8	2¼	1	3	1
9.00–20	10	2¼	1	3	1
10.00–20	10	2½	1½	3	1
11.00–20	12	2¾	1¾	3	2*
12.00–20	14	3	2	4	2*
14.00–20	12	3½	2½	4	2*
14.00–20	20	3½	2½	4	2*
14.00-24	20	3½	2½	4	2*

*When two sectional type repairs are permitted, they must be far enough apart that patches will not overlap.

2–3. Bad Ozone Cracking on Tread

Although the tire had been rendered unserviceable by exposure to ozone, the sidewall remains undamaged. Removing the tread by buffing will produce a retreadable tire. The classification of "CRC F" is therefore correct.

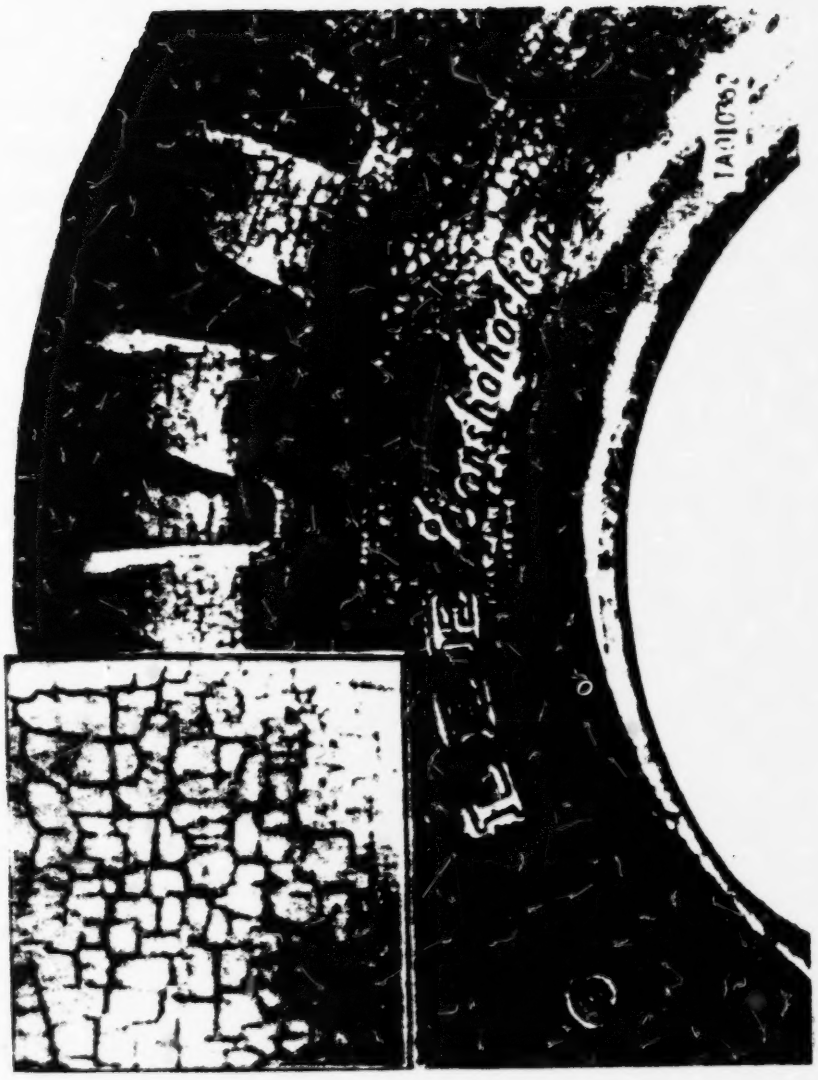

Figure 2-3. Oxidation of sidewall.

2–4. Bad Ozone Cracking on Sidewall

In comparing this tire to the one in figure 2–4 we see that the cracks extend down over the sidewall. This tire can't be retreaded using conventional methods and should have been classified "CRC H".

NOTE

If the tire being classified is a high-dollar off-the road type tire, such as one used on earthmover equipment, a bead-to-bead repair may be authorized by TACOM. This repair entails replacement of sidewall rubber and is performed as an exception only.

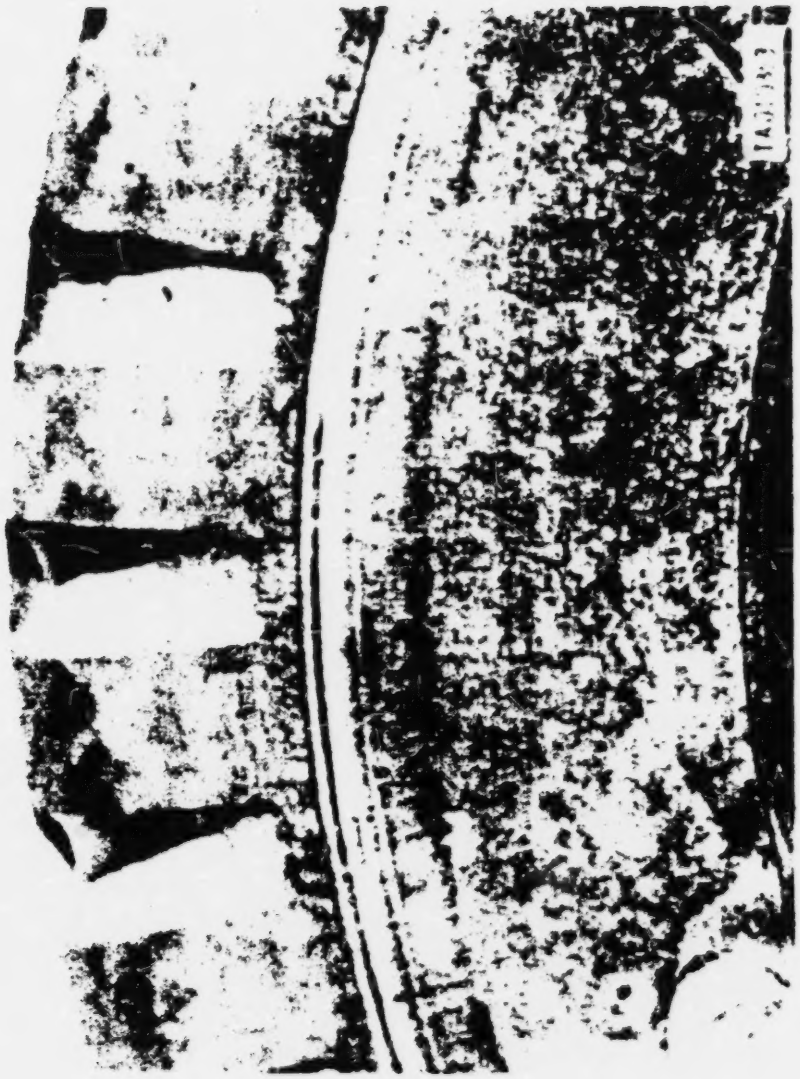

Figure 2–4. Slight deterioration of sidewall.

2–5. Superficial Cracking on Sidewall

The ozone deterioration here is only slight and the tire casing is sound. The tire has been classified properly as "CRC F".

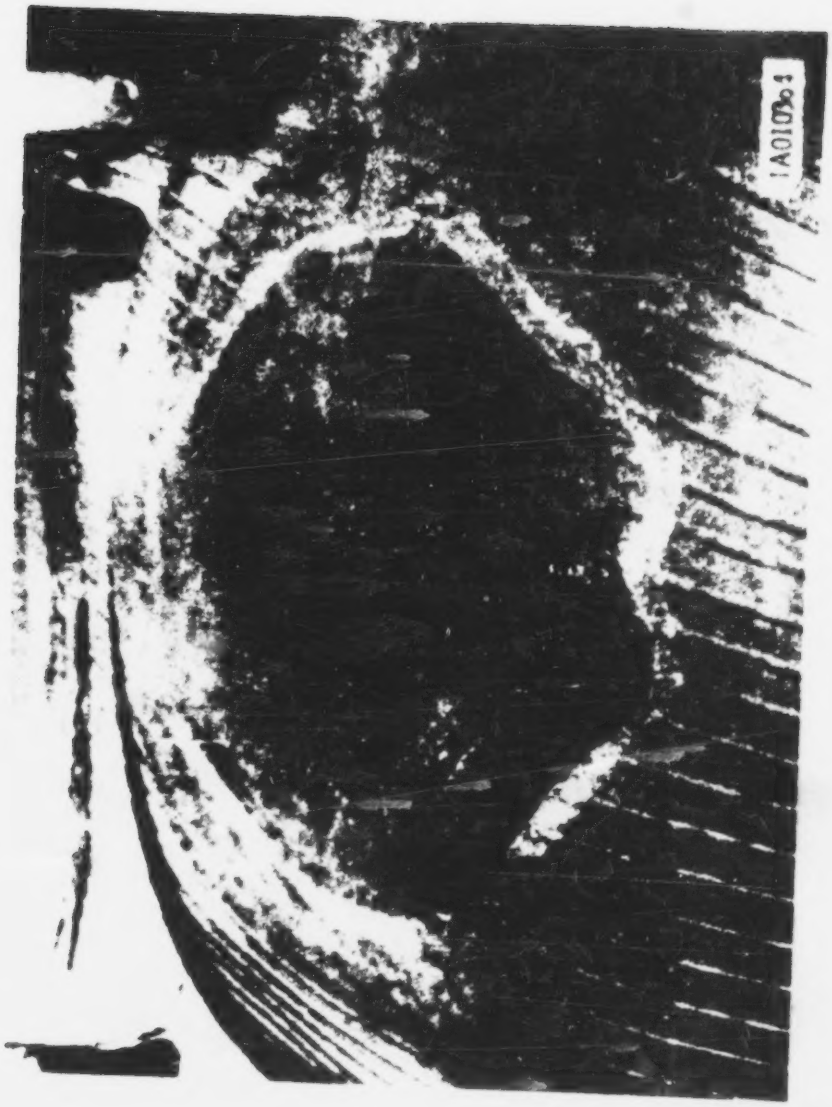

Figure 2-5. Tire repaired previously.

Section III. CUTS, BREAKS AND TEARS

2–6. Previous Section Repair

This tire was repaired once, then worn to the permissible maximum and again submitted for repair/retreading. The previous repair has not failed, and the tire is still retreadable. The classification of "CRC F" is correct.

Figure 2-6. Flexbreak injury.

2–7. Flexbreak of Tire

This type of injury, which looks like a series of breaks is result of excessive bending of an underinflated tire running on overload or similar causes. It cannot be repaired and must be classified "CRC H".

Figure 2–7. Torn area in tread.

2–8. Permissible Section Repair

This tire is torn in the tread area close to the tire crown. The tear can be mended with a section repair, thereby repairing the tire. This tire can be retreaded later (para. 2–6). It has been classified correctly as "CRC F". The insert shows what the tear looks like inside the tire.

Figure 2-8. Tear in bead area.

2–9. Non-Permissible Section Repair

The tear shown (fig. 2–8), if mended, would result in a section repair running into the bead area. The tire should have been classified "CRC H".

Figure 2-9. Tear in bead area (outside).

2–10. Non-Permissible Section Repair (Outside)

Figure 2–9 shows an outside view of the tire. Here we see that the tear is not only too close to the bead area, but also too long, extending nearly the full width of the tire sidewall. Another reason for a proper classification of "CRC H".

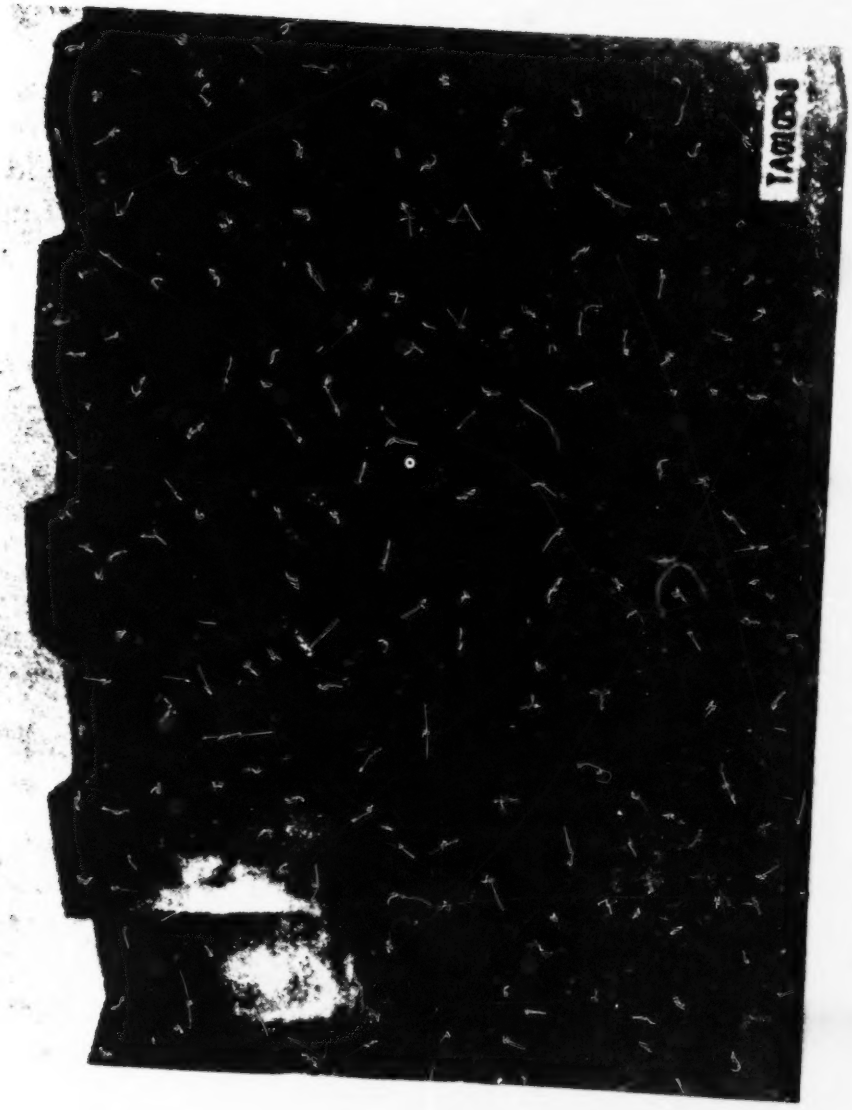

Figure 2-10. Heel and toe irregularity.

Section IV. TREAD WEAR

2–11. Heel and Toe Wear

This condition (fig. 2–10) is caused by irregular wear, but when the tread is removed by buffing, the undertread will not be damaged. The tire is retreadable and is correctly classified "CRC F".

Figure 2–11. Overinflated tire wear no ply left.

2–12. Tires Run Overinflated

Figures 2–11 and 2–12 depict excessive wear on the tire crown, resulting from overinflation. The tires have run hard, with incomplete contact between the tread and road surfaces. The wear in figure 2–11 has extended into the second ply of a 4-ply tire, which should have been classified "CRC H".

Figure 2–12. Overinflated tire wear with ply left.

2–12. Tires Run Overinflated—Continued

This illustration (fig. 2–12) shows that the wear has not yet reached the plies of the tire. The tire has been correctly classified "CRC F".

Figure 2-13. Wear and tear on plies.

2–13. Plies Worn Through

This tire was used too long and has been destroyed beyond repair. It should have been classified "CRC H". The wear has gone into the third ply.

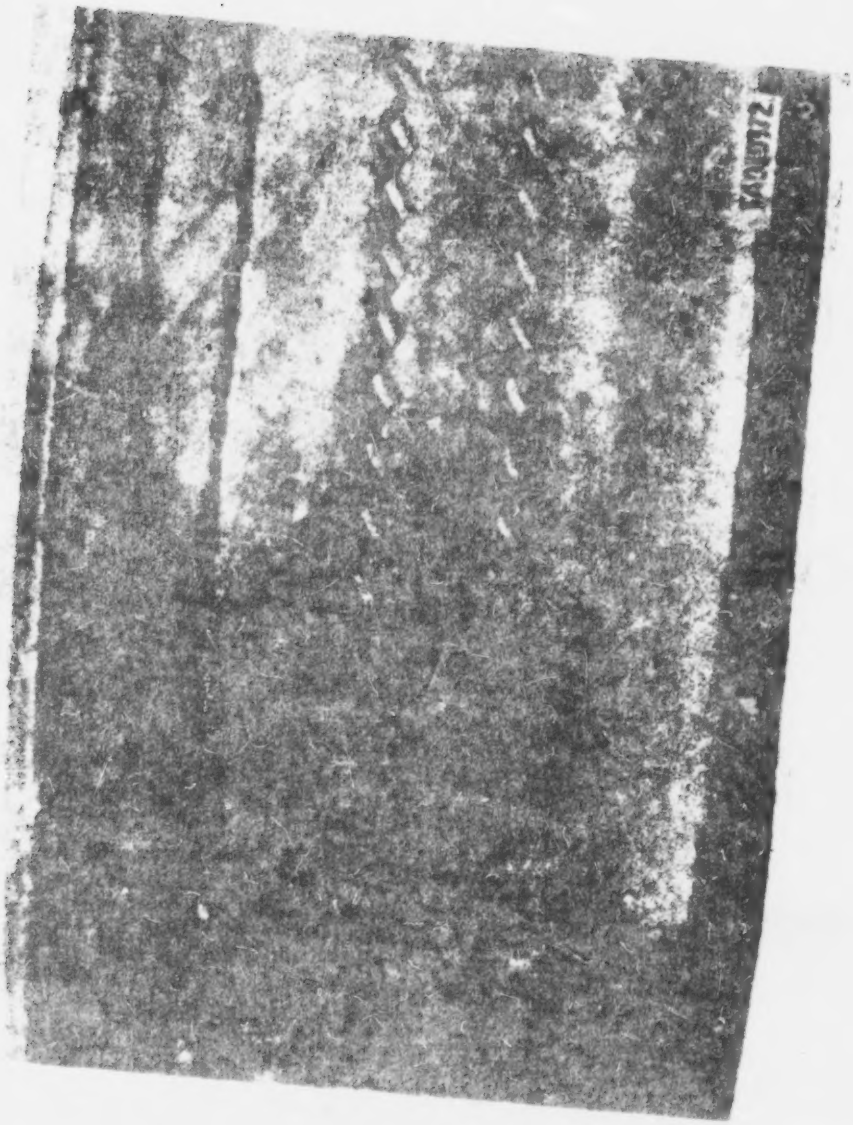

Figure 2-14. Uneven wear on plies.

2–14. Uneven Wear

This condition (figure 2–14) was caused by front end misalignment of the vehicle. There are still traces of tread visible and the tire can still be re-treaded. Correct classification is "CRC F".

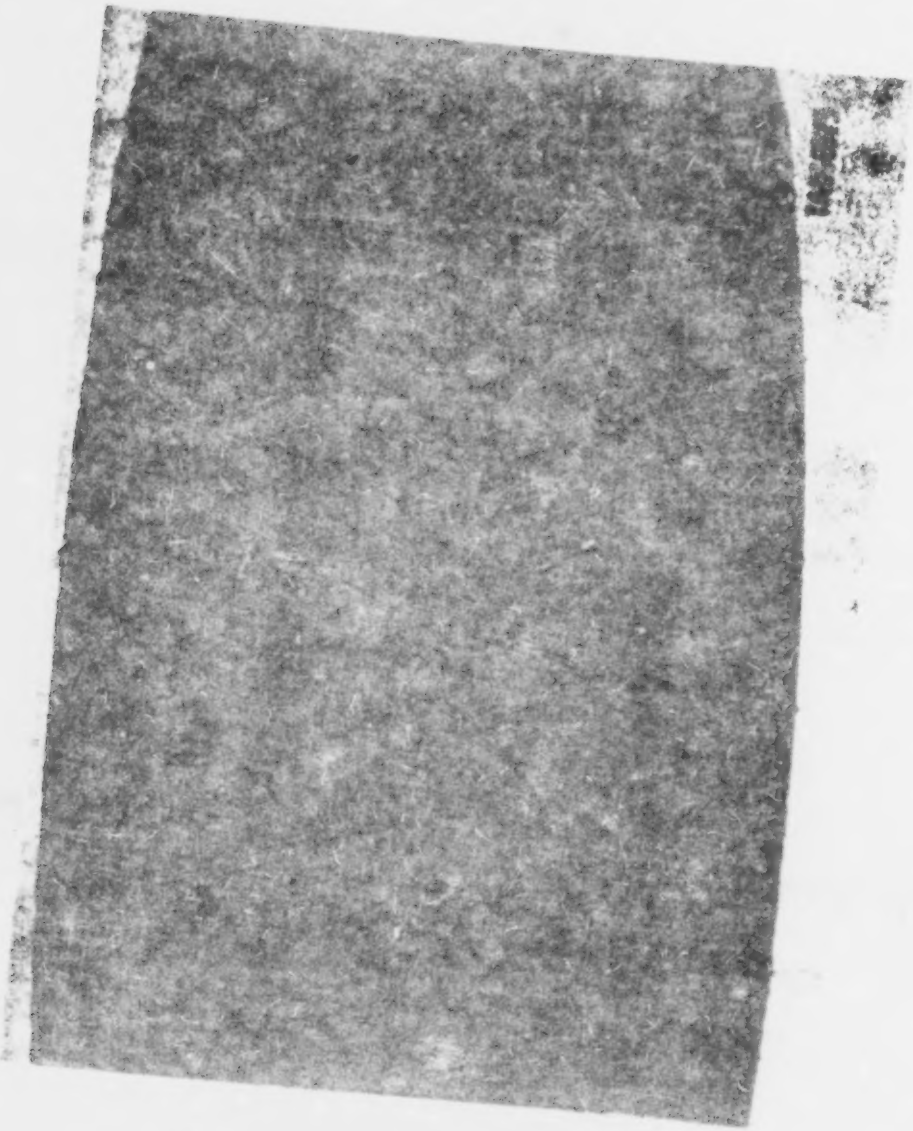

Figure 2-43. Tire worn bald.

2–15. Excessive Tire Wear

The tire has been worn bald, and is a borderline case for the classification inspector. It was correctly classified "CRC F" and sent to the retreader who will attempt to buff it without biting into the cord plies. If this operation is successful the tire can be retreaded without problem. Since the classification inspector could not see how deeply the wear extended, it was better to let the retreader try to save the tire than to discard it.

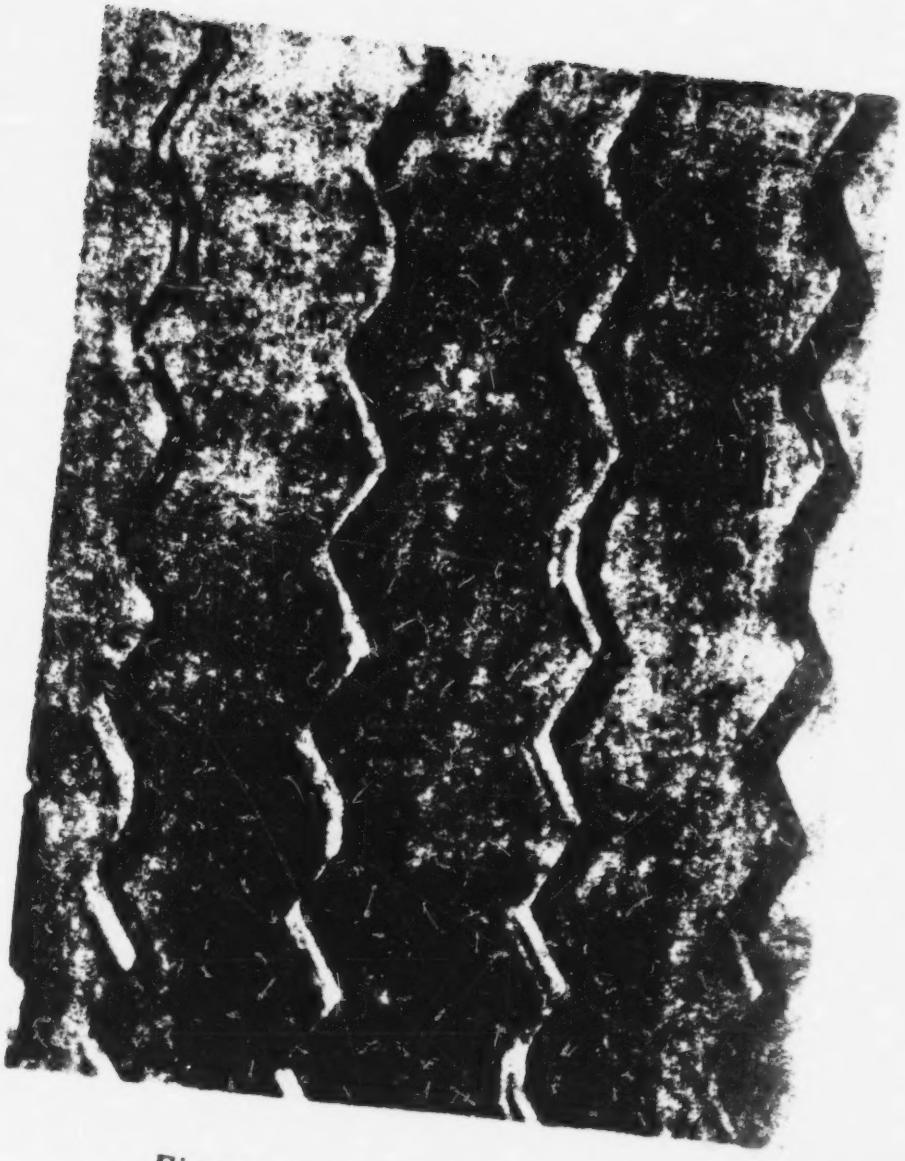

Figure 2-16. Tread wear (50%).

2–16. Premature Removal

Less than 50 percent of the tread has been worn on this tire. Instead of sending the tire to the retreader as "CRC F", the inspector should have classified it as "CRC B" and returned it to the user.

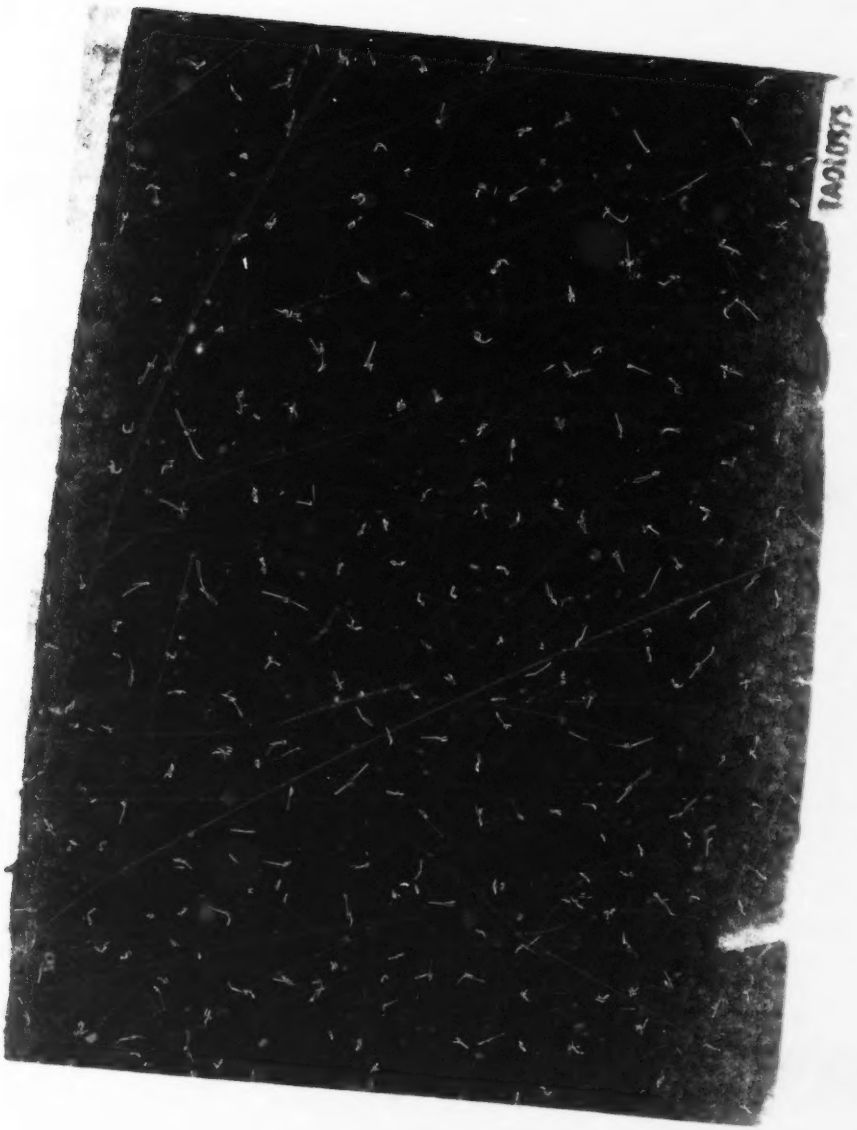

Figure 2–17. Proper time for retreading.

2–17. Proper Timing for Tire Turn-in

Figures 2–17 and 2–18 are typical examples of what a military and commercial tread will look like when they are worn sufficiently to be turned into maintenance for retread, but before the wear becomes dangerous. These tires were correctly classified "CRC F".

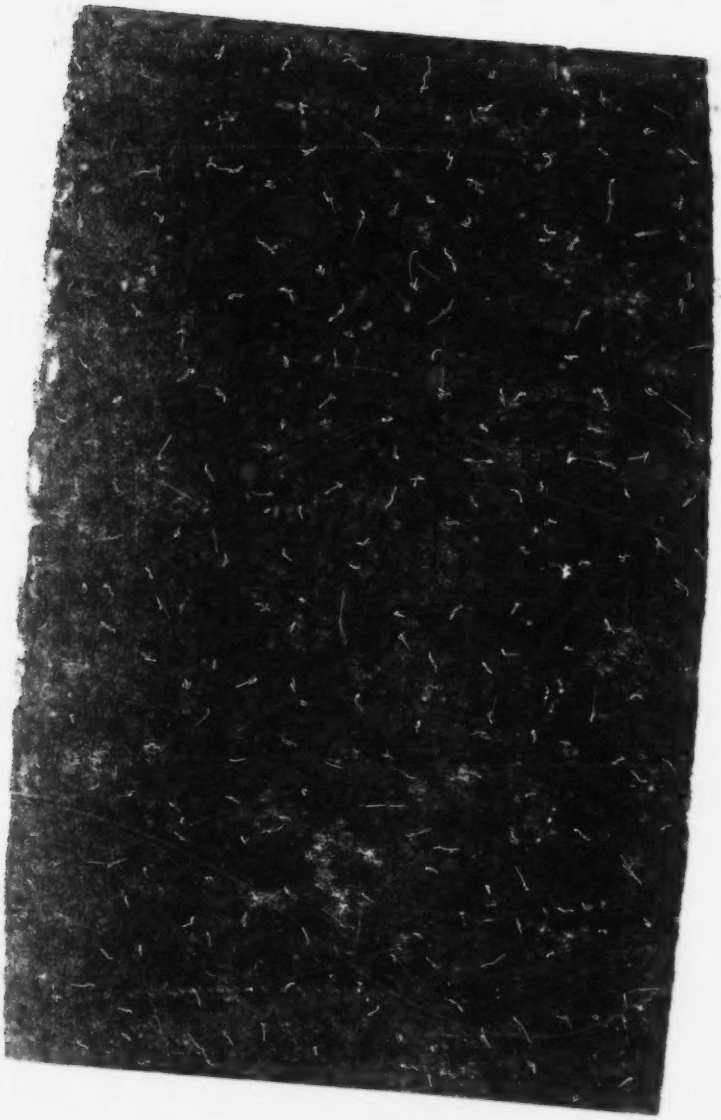

Figure 2-18. Typical tire for retreading.

2–17. Proper Timing for Tire Turn-In—Continued

This illustration is another example when tire is worn sufficiently to be turned in for retread. Correct classification is "CRC H".

Section V. PERMANENT DEFORMATION

NOTE

The following illustrations represent permanent deformation defects, which in most cases, can be seen before a tire is mounted on a spreader. They are obvious, and mean that the tire cannot be retreaded. Sending them to the retreader, where they are photographed, would be a waste of scarce funds. Although a commercial contractor may not charge for pick-up and delivery, the costs to him would be included in his retreading price.

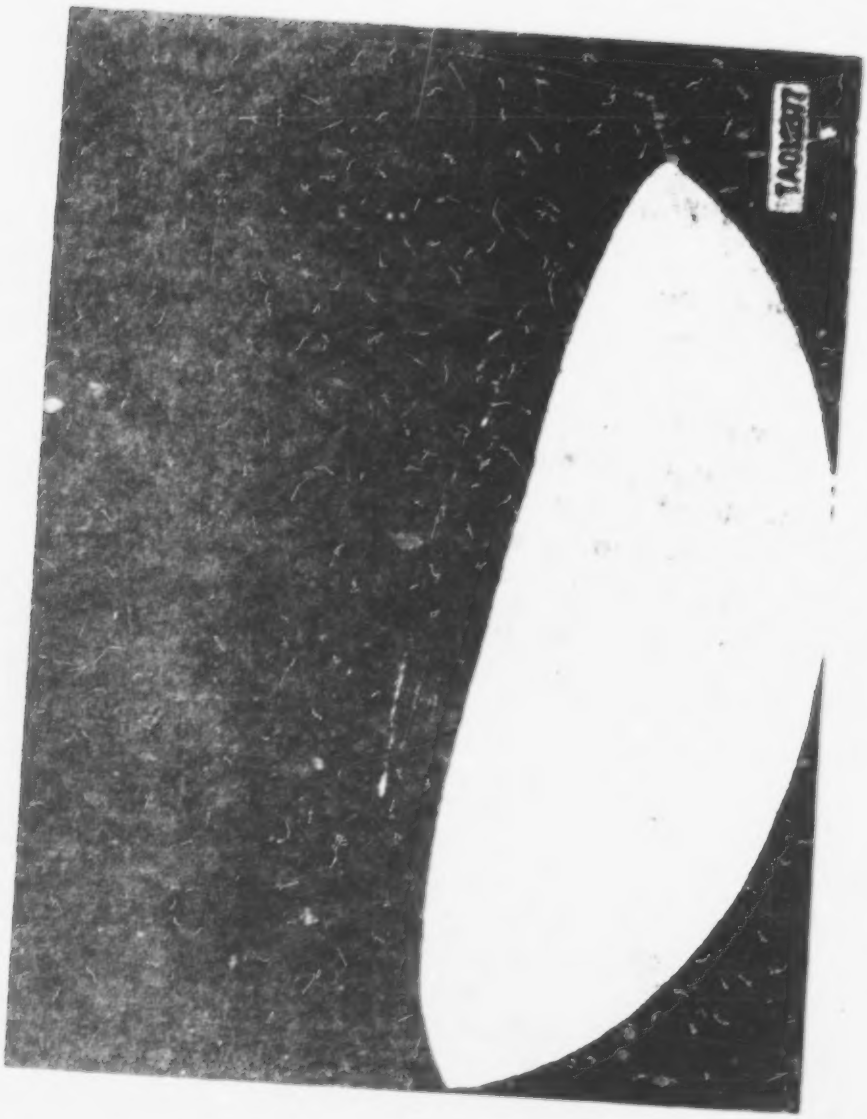

Figure 2–19. Tire damaged at bead area.

2–18. Bead Damage

The bead was destroyed by removing the tire from the rim without the use of a proper demounting tool and tire lubricant. It can't be repaired and should have been classified "CRC H".

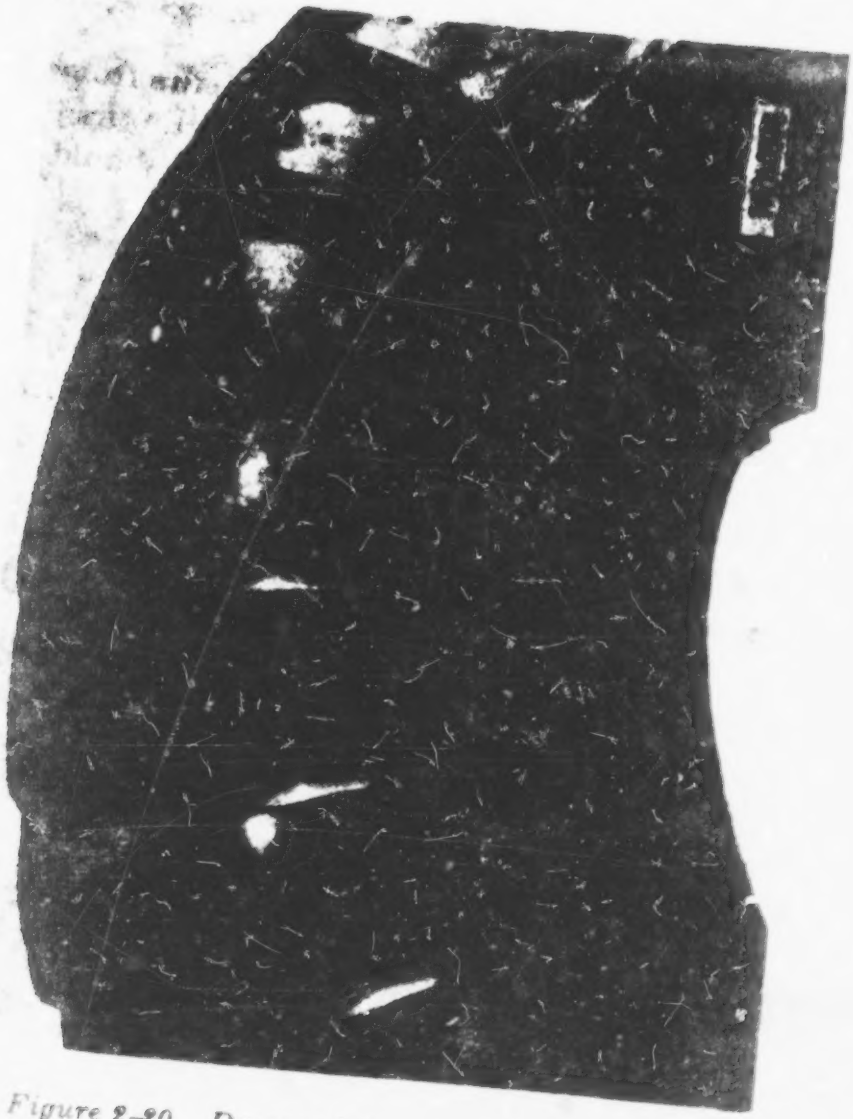

Figure 2–20. Damaged tire when run flat (inside of sidewall).

2–19. Tires Running Flat

Figures 2–20 and 2–21 illustrate what a tire looks like when it was run flat for a few miles. If the tire had been run much longer, the whole crown would have been sheared off. However, the tire damage still renders it irrepairable. Note the long chain of internal cuts along the inside of the sidewall (fig. 2–21) and signs of shearing on the outside (fig. 2–20). Proper classification is "CRC H".

Figure 2-21. Damaged tire when run flat (outside sidewall).

2–19. Tires Running Flat—Continued

When this tire ran flat for a few miles it started to damage the outside sidewall. Just as the damage in figure 2–20 the classification is "CRC H".

Figure 2-22. Sitting in a flat state too long.

2–20. Tires Sitting Flat

This tire went flat while the vehicle was parked and remained flat for some time. Unlike the damage done in paragraphs 2–18 and 2–19, the sidewall was not sheared. But it has been bent permanently out of shape and many cords could be broken in the sidewall. The tire is irrepairable and should have been classified "CRC H".

Figure 2-28. Kinked bead damage.

2–21. Tire Reflecting Kinked Bead

Removal of the tire from its rim without proper lubrication and/or a demounter resulted in damage that cannot be repaired. Proper classification would have been "CRC H".

Figure 2–24. ***Tubeless tire damage (chafer strip).***

2–22. Damaged Chafer Strip, Tubeless Tire

The tire will no longer seal its own air, and thus cannot be used without a tube. Nevertheless, this defect alone is not sufficient cause for rejection. The retreader will mold the letters "TR" on the sidewall to identify it as a tube tire. Correct classification is "CRC F".

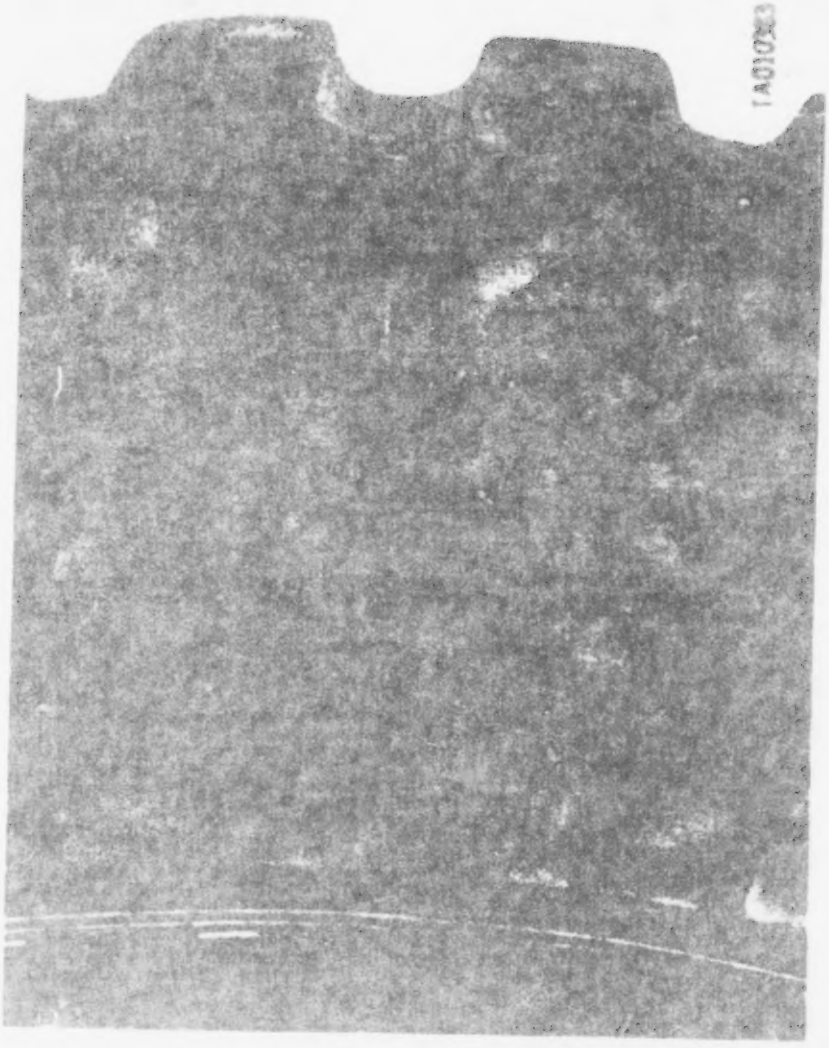

Figure 2-25. Open splice defect to tire

Section VI. SEPARATIONS

2–23. Tire Depicting Open Splice

This type of defect is peculiar to tires previously retreaded. If the camelback applied was too short, an opening will appear where the two bevelled edges were joined. The defect should not be confused with a separation, break, or tear. It can be identified easily, with a little practice, if the inspector looks for the bevelling. Since the defect does not go deeper than the tread rubber, the tire can be retreaded successfully, and should be classified "CRC F".

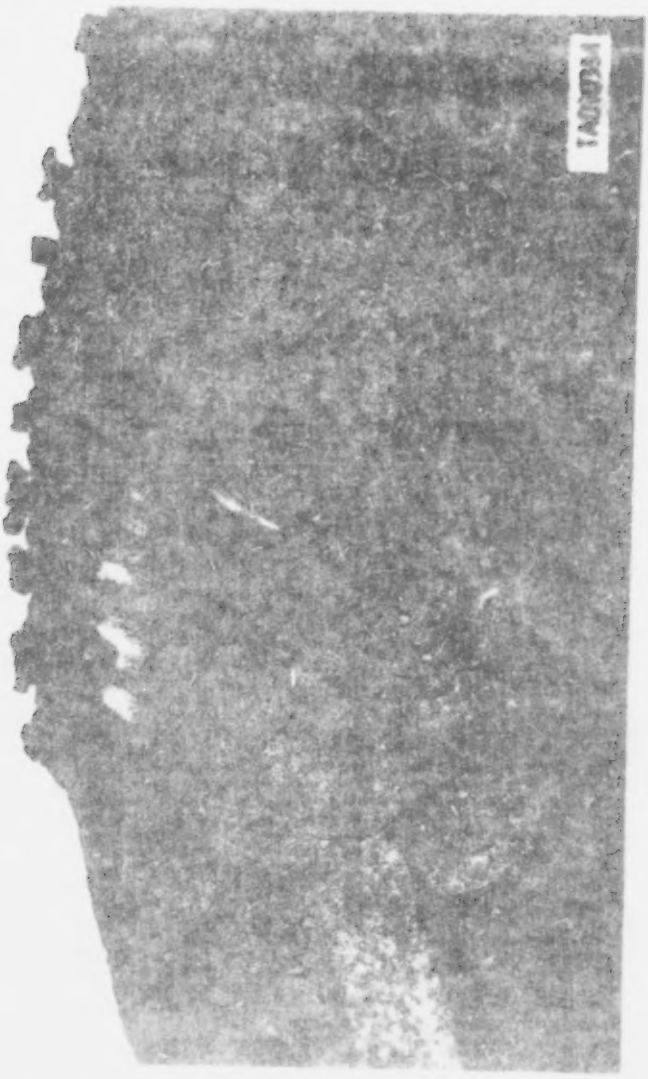

Figure 2-26. Insufficient bonding technique.

2–24. Tread Separation

Another defect most commonly found on re-treaded tires is where the tread rubber was not bonded successfully onto the casing, and is thrown off in use. The undertread is undamaged and the casing remains sound. The tire should be classified "CRC F" and returned to the retreader for re-work. If the retreader is operating under a GSA administered contract, his work bears a warranty, and adjustment should be made.

Figure 2-27. Undertread separated from casing.

2–25. Undertread Separation

Compare this illustration with that of figure 2–26. Here we have a break in the undertread rubber which has separated from casing, exposing the cord plies. There is no way for this tire to be buffed, and the classification must be "CRC H".

Figure 2-28. Separation of tread and undertread.

2–26. Tread and Undertread Separation

The separation depicted here is extreme, where there was a poor bond at both the tread/undertread and the undertread/casing interfaces during retreading. This is really a composite of the defects shown in figures 2–26 and 2–27 and should have been classified "CRC H". This tire should be returned to the retreader for adjustment or exchange due to inferior workmanship.

CHAPTER 3
INSPECTION OF DEFECTIVE TIRES

Section I. INTRODUCTION

3–1. Purpose.

The vast bulk of tires that are retreaded for the military services are done on contract. It is therefore in the interest of this chapter to help the inspectors to make the determination as to whether or not to accept tires retreaded by a commercial contractor.

3–2. Scope.

The illustrations and paragraphs that follow depict the kind of defects that result in either a destruction of the tire or just an improper job by the retreader. If the latter is the case then a monetary adjustment from the retreader should be sought or else the improper job should be returned to the retreader for re-work.

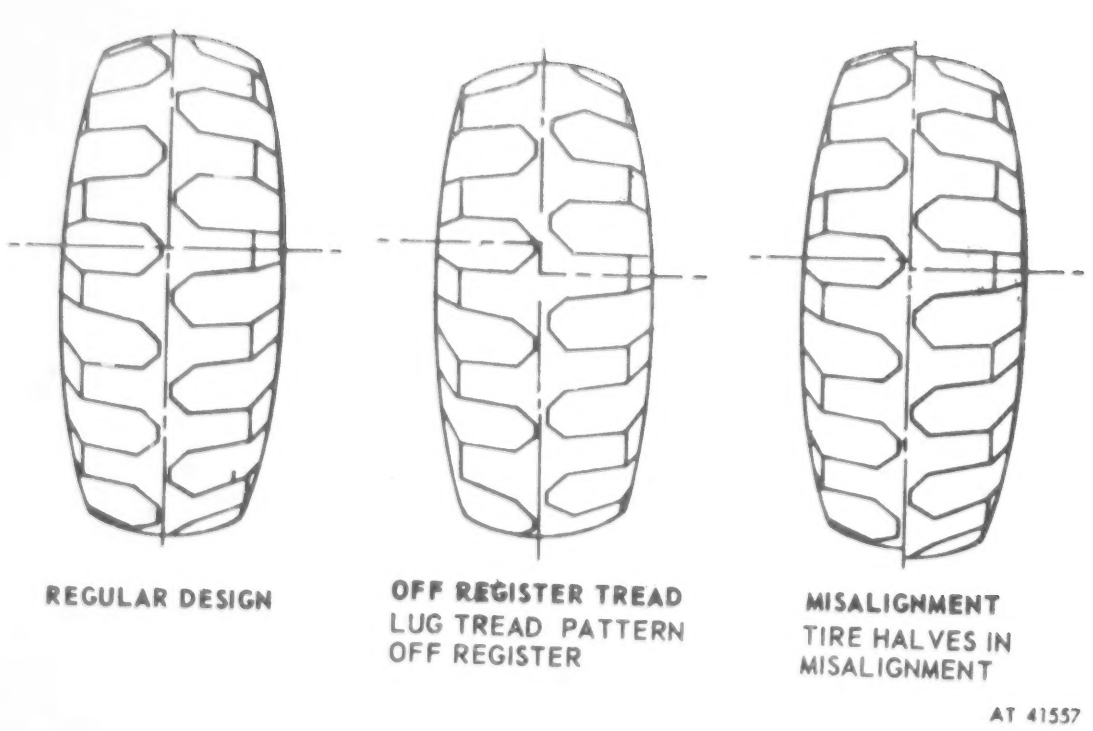

Figure 3-1. Improper mold alignment.

Section II. SPECIFIC TYPES OF DEFECTIVE TIRES

3–3. Mold Misalignment

Mold misalignment is one of the most common defects produced by a careless retreader. It is caused by improper lining up of the mold. In most cases the tire is probably marginal. Nevertheless it should be returned to the retreader for re-work.

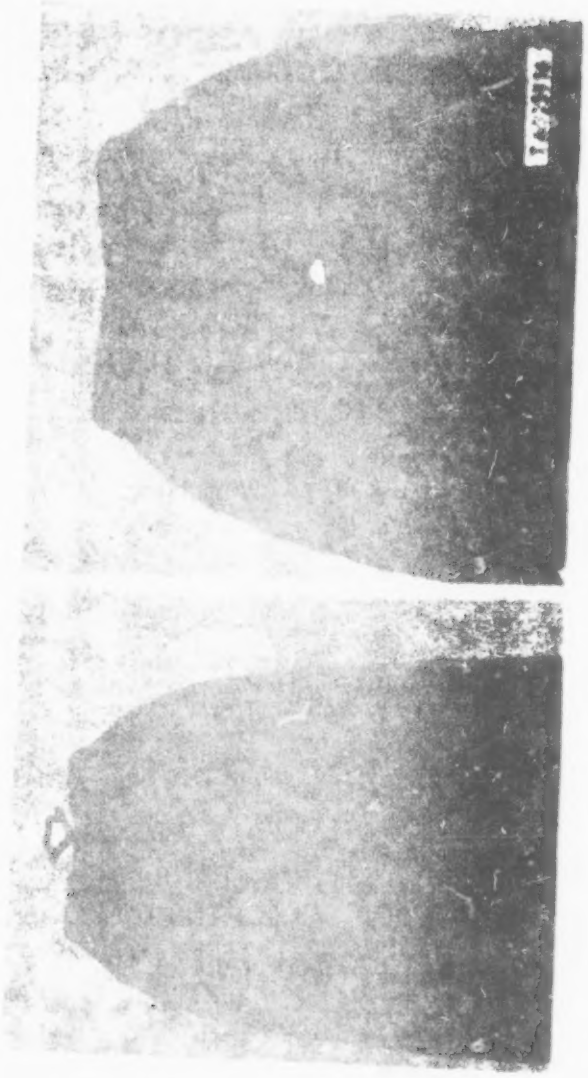

Figure 3–2. Crown of tire buckled (unmounted).

3–4. Buckled Crown Condition (Unmounted)

The condition reflected in figures 3–2 and 3–3 is one which destroys a tire. The cause of this condition is by the retreader itself. He has failed to leave on hand enough matrix sizes to do a proper job. When this is the case he tends to squeeze the tire into a mold/matrix combination too small and deforms the tire permanently. These illustrations show the more common type of buckling (on the crown). When this condition is suspected then care must be taken with the tire.

Figure 3–3. Crown of tire buckled (mounted).

3–5. Buckled Crown (Mounted)

Some tires are manufactured with a concave crown while underinflated, but as soon as they are inflated they will assume a flat shape as shown in figure 3–2.

Figure 3–3 reflects a buckled tire because when it becomes inflated the crown assumes a convex shape, just as if it were over inflated. Note that the tread is distorted with wide grooves in the center and narrow grooves near the shoulders of the tire.

In all cases buckled tires should be returned to the retreader for a monetary adjustment. Absolutely no attempt should be made at retreading.

READEX FICHE

Figure 3-4. Sidewall of tire buckled.

3–6. Buckled Sidewall

Sidewall buckling is far less common. It is an extreme result of poor workmanship and can easily be recognized. Once buckled, the tire has been permanently deformed and should never again be retreaded or used.

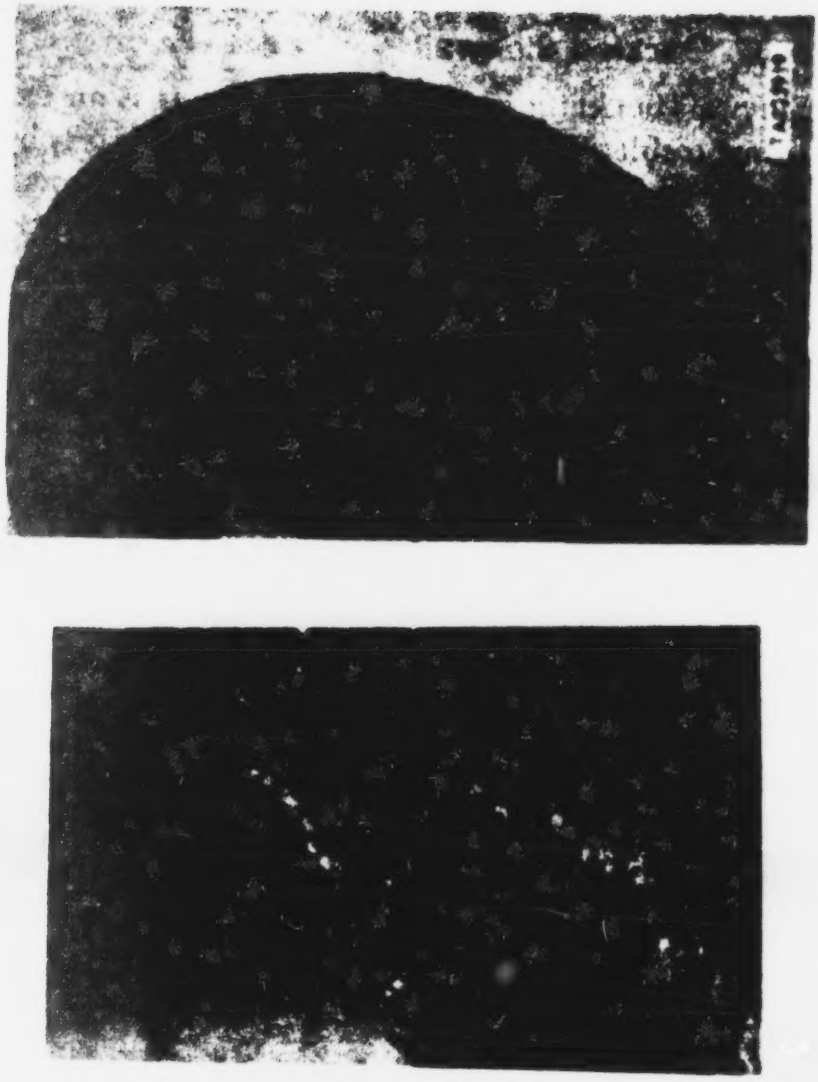

Figure 3–5. Excessive buffing of sidewall.

3–7. Excessive Buffing

When this tire lost its tread, it became apparant that the cause of failure was inadequate bonding of the new tread because the retreader buffed deeply into the sidewall. This tire cannot be reworked.

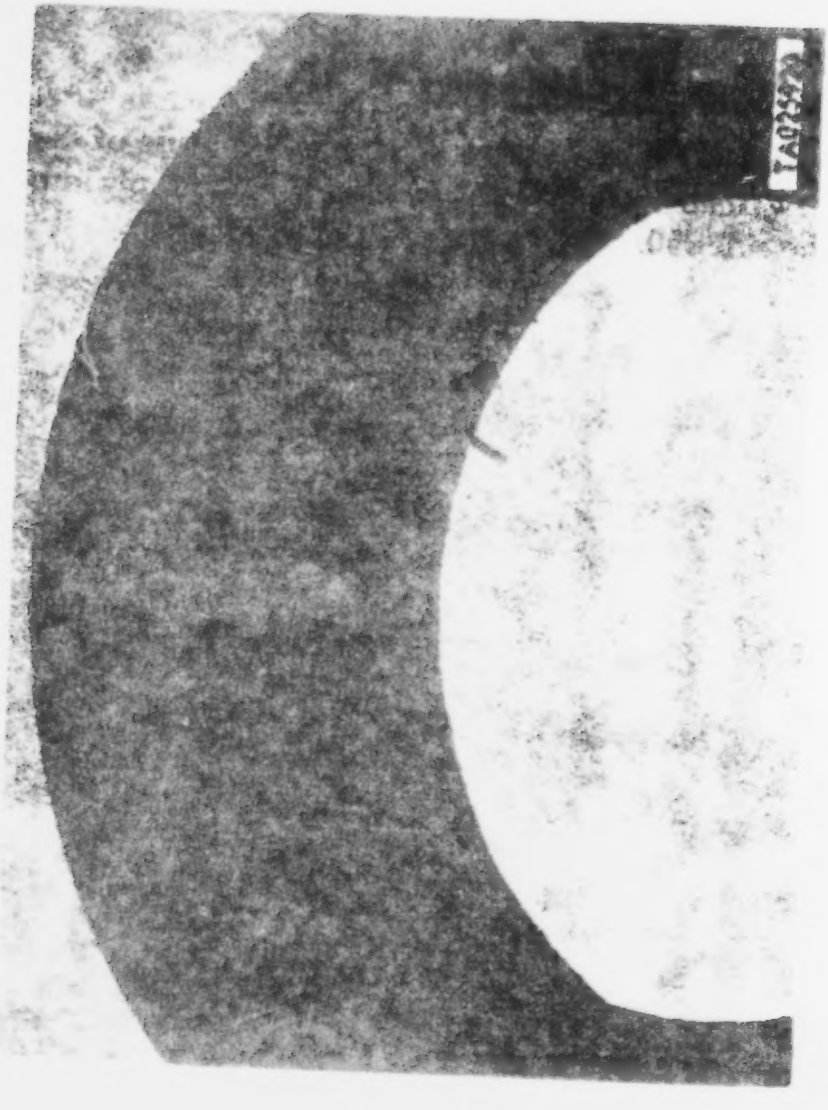

Figure 3-6. Slight overbuffing of sidewall.

3–8. Tire Slightly Overbuffed

Here the buffer bit only slightly into the sidewall. The tire should be returned to the retreader for rework.

Figure 3–7. Protrusion of bleeder strings.

3–9. Bleeder String Protruding

Bleeder strings are strings sometimes put into a tire to vent off air during the molding operation. This is not a common practice, although it is not objectionable. The protruding string causes no harm, but should be clipped off flush to the tire surface.

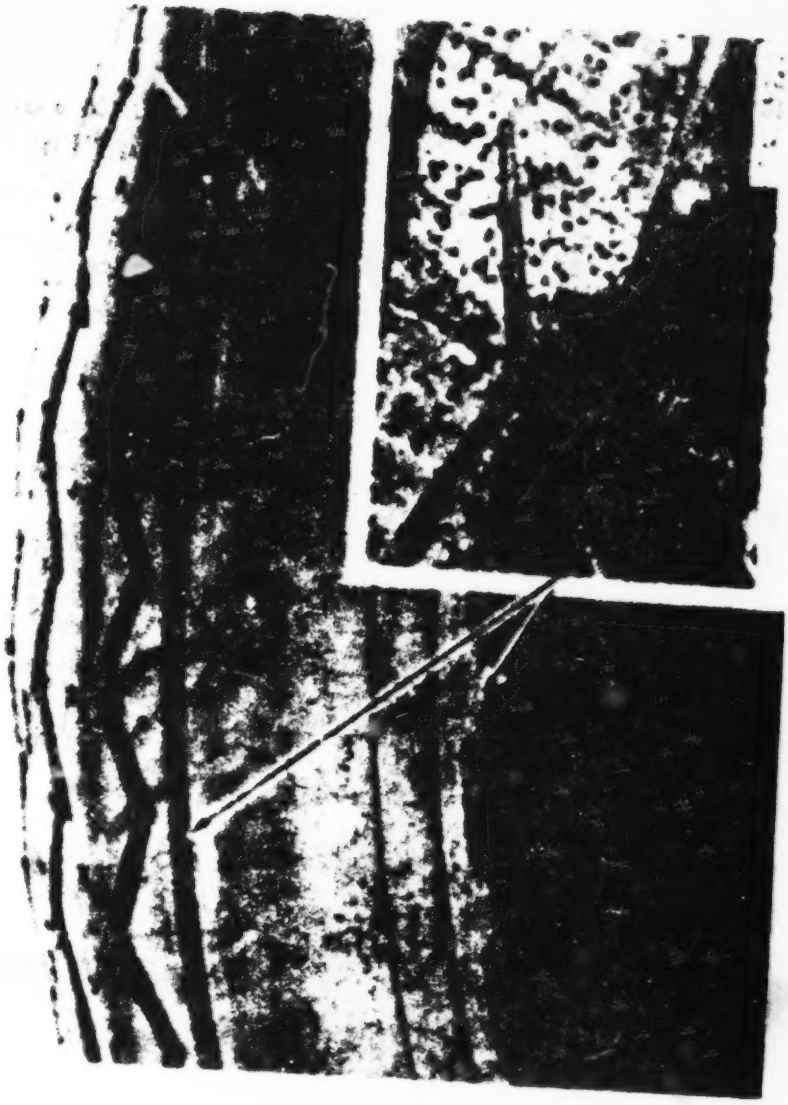

Figure 3–8. Porous condition.

3–10. Spongy (Porous) Cure

The condition as indicated by the arrows in figures 3–8 is brought about by an unacceptable combination of pressure, temperature and time during the curing process. When cutting a thin layer from the tire as shown in the insert the spongy porous condition is more apparent.

With this particular defect the tire should be returned to the retreader for re-work.

Figure 3–9. Insufficient amount of undertread.

3–11. Insufficient Undertread

a. The undertread of the tire should be at least ¼ inch as thick as the tread itself. When this is insufficient, it means that either the retreader did not build up enough rubber or else the mold was open and the rubber flowed out. In either case the tire should be returned for rework.

b. This defect is often present when the tire buckles in the mold due to squeezing. If this becomes the case, the tire is permanently deformed and monetary compensation should be sought in lieu of any re-work.

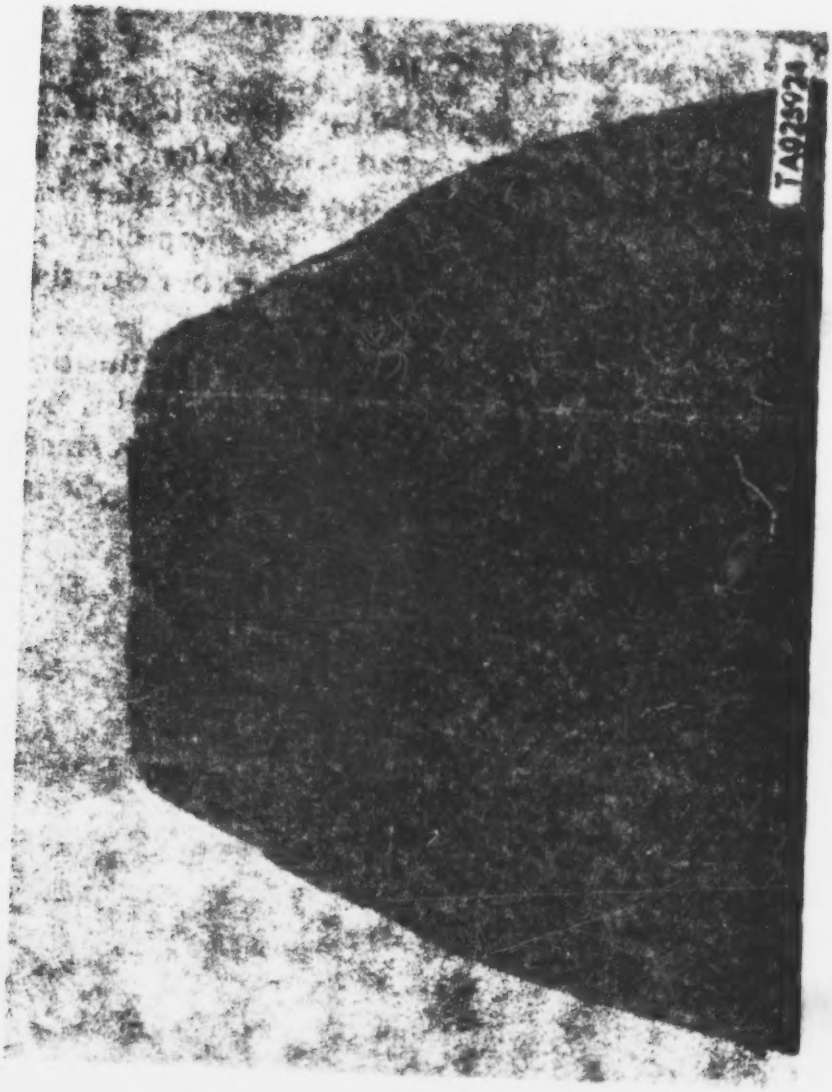

Figure 3–10. Lack of design on spacer.

3–12. No Design on Spacer

The condition shown on figure 3–10 will not cause a tire failure, but it will result in loss of traction. When this is the case the tire should be returned to the retreader for re-work.

Figure 3–11. Beads of tire are squashed.

3–13. Squashed Beads

This condition may be either permanent or temporary, depending on its cause. If the beads were squashed in the retreading (molding) process, it is permanent; if it is the result of tires being piled up on each other it is temporary. If severe difficulty is experienced in mounting, you can assume the tire was squashed in the mold, and should be returned to the retreader for adjustment.

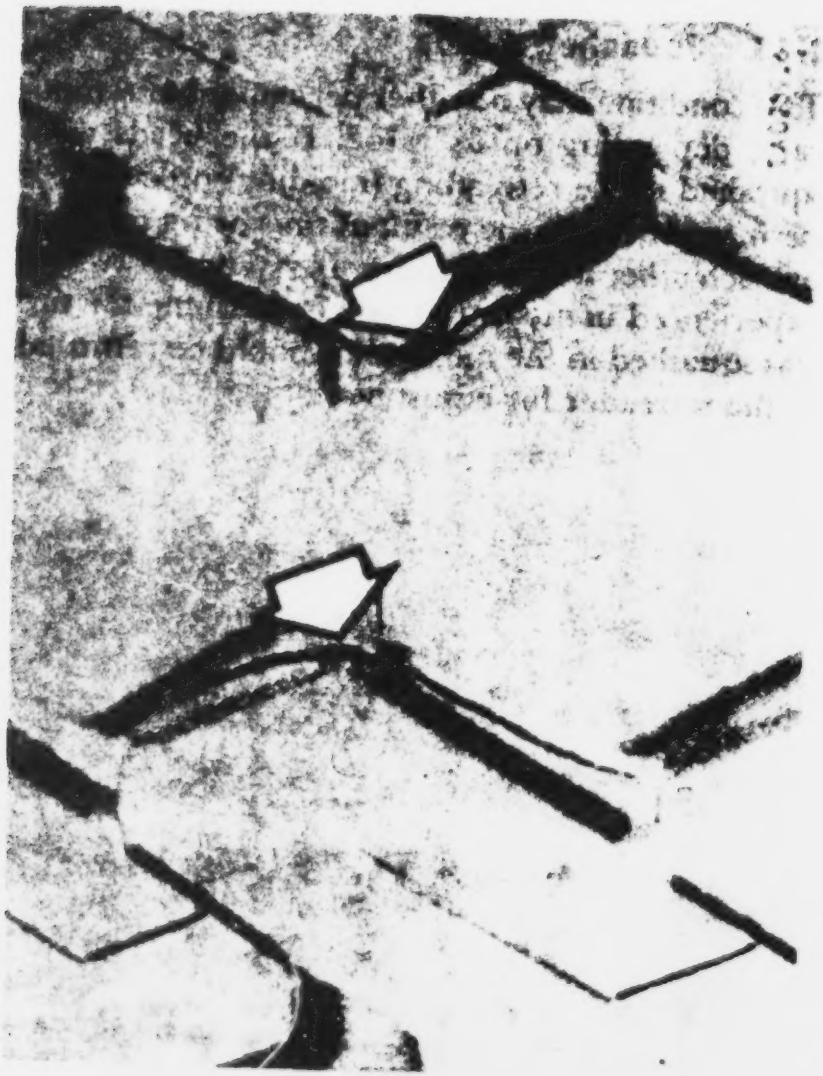

Figure 3–12. Tire reflecting cracks in undertread.

3–14. Cracks In Undertread

This illustration reflects cracks which occurred on a new tire immediately after inflation. The problem was that the tire was too large for the mold, so consequently, the retreader put on very little rubber. A tire like this should be returned for rework.

Figure 3–13. Tire bead cut.

3–15. Cut Bead Condition

This tire was somehow destroyed. The retreader failed to spot the defect prior to delivery, and must provide adjustment.

Figure 3–14. Insufficient flow of rubber at splice.

3–16. Improper Rubber Flow at Splice

Improper build-up prior to molding caused this defect. The tire should be returned for rework.

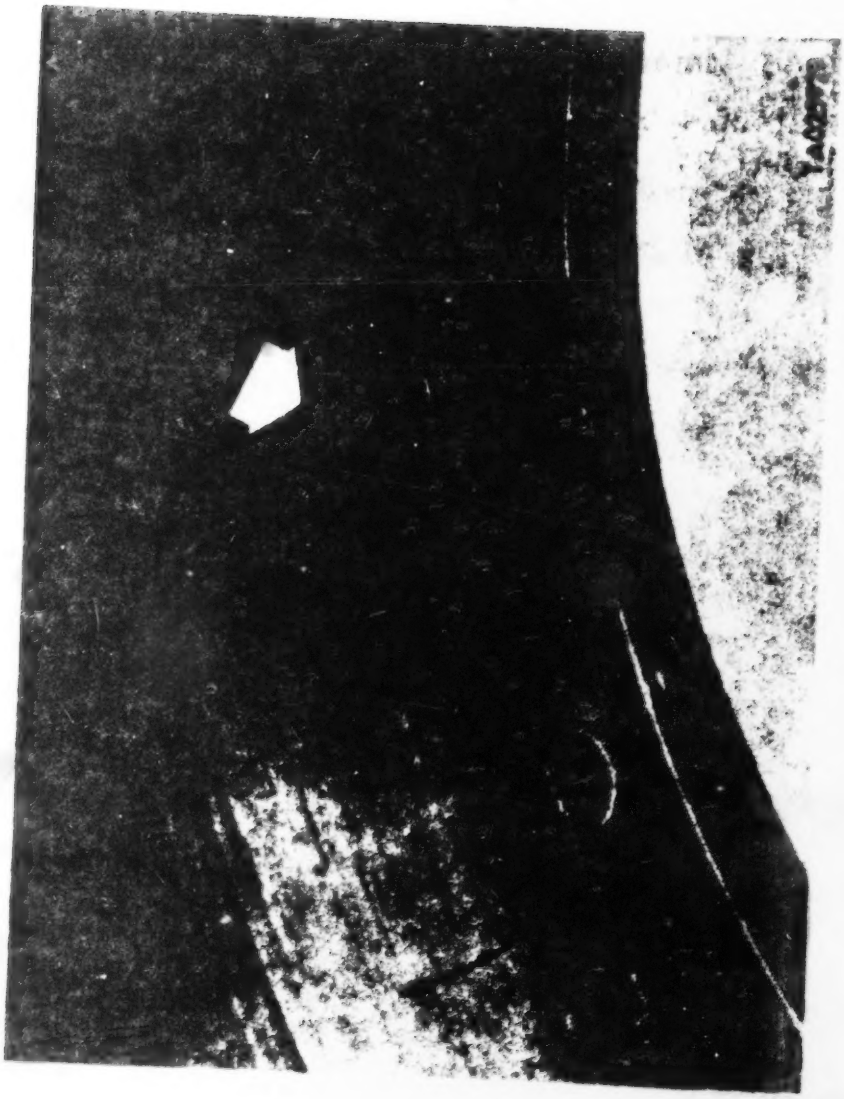

Figure 3-15. Sidewall showing patch repair.

3–17. Patched Sidewall

The repair is too close to the bead and monetary compensation should be sought.

Figure 3–16. A cut in the sidewall.

3–18. Cut In Sidewall

A defect not readily spotted by the retreader is the one shown in figure 3–16. The tire should be returned for rework.

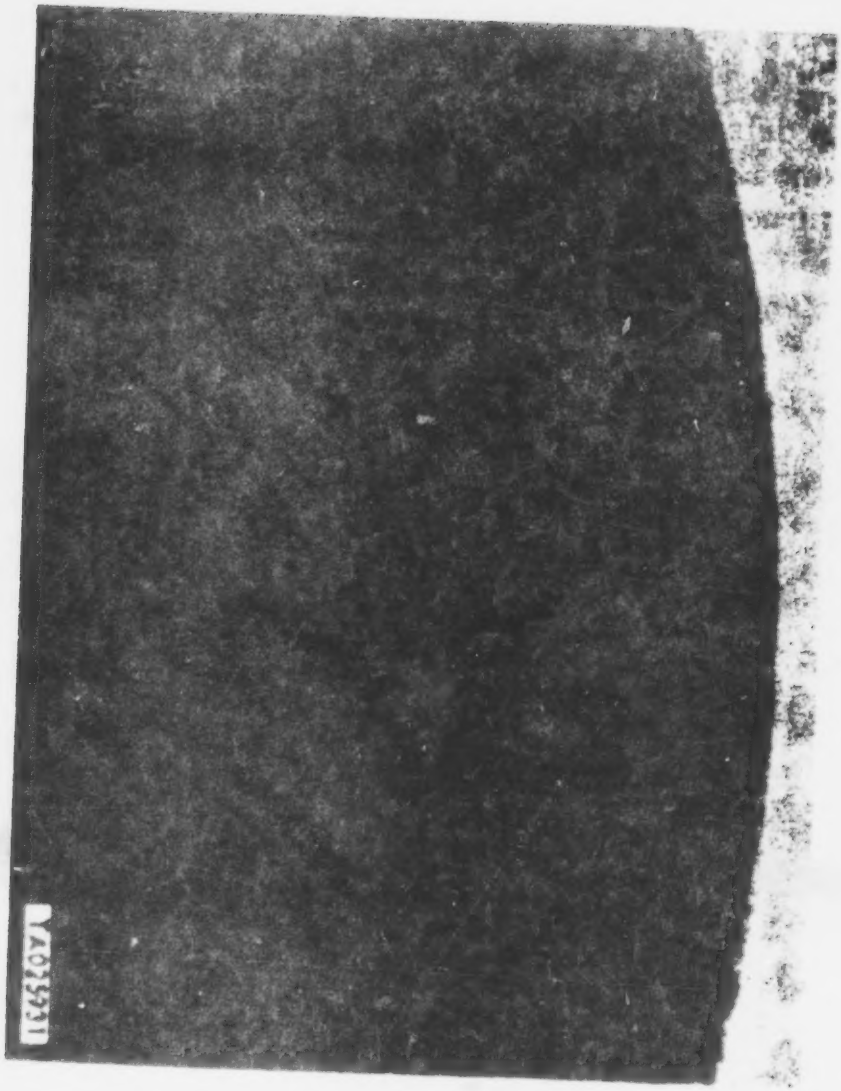

Figure 3–17 Retreading over existing retreader condition.

3–19. Retread Over Retread

The defect (fig. 3–17) cites the failure of the retreader to remove all of the old rubber prior to the build-up of the tire. This should be returned for re-work.

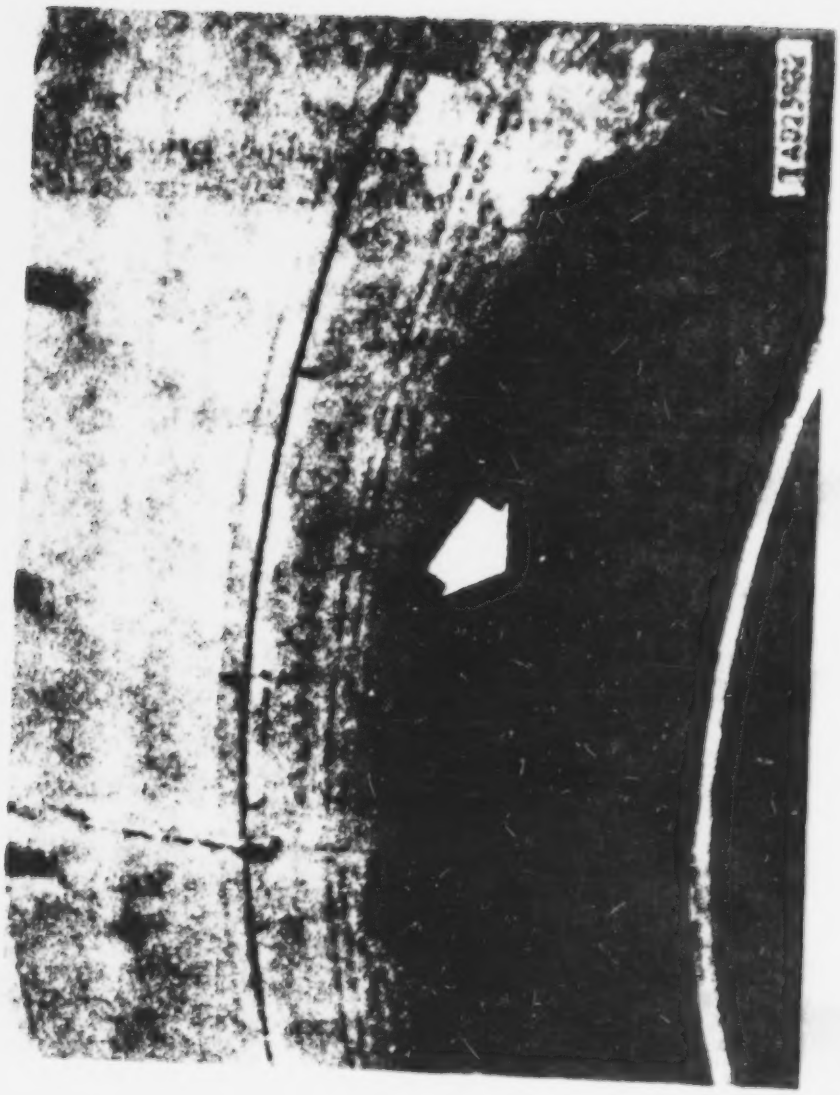

Figure 3–18. Injury to tire during retread operation.

3–20. Tire Injured During Retreading

This injury is the kind that was missed by the re-treader. Return the tire for re-work. If the repair turns out to be too close to the bead then monetary compensation should be sought.

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

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